CLAIMS:

1. A method of estimating the state-of-charge of a Li-ion battery, comprising the steps of:

- measuring the voltage across the battery during a first measurement and converting this measured value into the state-of-charge (SoC_s);
- subsequently charging the battery;
- measuring the voltage across the battery during a second measurement and converting this measured value to a measured state-of-charge value(SoC_e);
- determining the accumulated charge during charging by integration of the charge current;
- subtracting the measured state of charge (SoC_s) in the first measurement from the state-of-charge (SoC_e) in the second measurement; and
- updating the value of the maximum capacity of the battery (Cap_{max}) by relating the charge withdrawn from the battery with the result of the subtraction (SoC_e-SoC_s),

characterized in that at least the second measurement is executed during charging.

2. A method as claimed in any of the preceding claims, characterized in that during the second measurement the current has a value at which the battery can be regarded to be in equilibrium.

3. Method as claimed in claim 1 or 2, characterized in that the Li-ion battery is charged according to the CC-CV-regime and that the second measurement takes place in the CV-regime.

4. A method as claimed in claim 1, 2 or 3, characterized in that the charging takes place by a pulsed current and that the measurements of voltage and current of the battery are subjected to low pass filtering.

5. A method as claimed in any of the preceding claims, characterized in that both measurements of the voltage of the battery take place with substantially the same temperature.

6. A method as claimed in any of the claims 1, 3, 4 or 5, characterized by the following steps:
- measuring the voltage of the battery in equilibrium;
- converting the measured voltage to a relative state-of-charge;
- integrating of the current in the non-equilibrium state to an accumulated charge;
- dividing the accumulated charge by the maximal capacity of the battery;
- adding the accumulated relative charge to the a relative state-of-charge obtained earlier in the equilibrium state of the battery.

7. A method as claimed in any of the preceding claims characterized in that the value of the state of charge is used to calculate an estimation of the remaining time of use of the battery.

8. Method as claimed in claim 7, characterized in that in the calculation of the remaining time of use an estimation of the overpotential is used.

9. A method as claimed in claim 8, characterized in that the estimation of the overpotential is determined by a model which regularly updated.

10. Method as claimed in claim 9, characterized in that the updating comprises the following steps:
- determining the state of charge of the battery;
- charging the battery;
- measuring the battery voltage at a moment during charging;
- determining the state-of-charge of the battery at the moment of the measurement by integration of the charge current and adding the result to the initial value of the state-of-charge;
- determining the value of the EMF from the state-of-charge;
- determining the overpotential by subtracting the determined value of the EMF

from the measured voltage;

- estimating the overpotential through a model wherein the same values for state-of-charge, current and temperature are used; and
- adapting the model by comparison with the determined overpotential.

11. Method as claimed in claim 10, characterized in that the method is repeated with another value of any of the following parameters: the state-of-charge, the charge current or the temperature.

12. Method as claimed in claim 10 or 11, characterized in that the method is repeated more than once, and that the parameters used in the design are adaptively updated with each measurement.

13. Rechargeable battery, characterized by means for executing a method as claimed in any of the preceding claims.

14. Charge apparatus, characterized by means for executing a method as claimed in any of the preceding claims.

15. Apparatus, comprising:

- measuring means for measuring the voltage across a rechargeble battery;
- storage means for storing a relation between the voltage across the battery and the state-of-charge of the battery; and
- current measurement means for measuring the charge current of the battery;
- integrating means for integrating the charge current;
- calculating means for converting this measured value into a state-of-charge value(SoC_s) by using a relation between the voltage across the battery and the state-of-charge, wherein the calculating means are adapted to subtract the results of two consecutive measurements and to update the value of the maximum capacity of the battery (Cap_{max}) by relating the charge supplied to the battery to the result of the subtraction (SoC_e-SoC_s),

characterized in that the apparatus is adapted to execute the second measurement during charging.

16. Apparatus as claimed in claim 17, characterized in that a low pass filter is incorporated into the measuring means.

17. Apparatus as claimed in claim 13, 14, 15 or 16, characterized in that the apparatus comprises a digital processor.